

CLAIMS:

1. A method of forming a capacitor structure, comprising:
forming a first electrical node;
forming a layer of metallic aluminum over the first electrical node;
transforming at least some the metallic aluminum within the layer
of metallic aluminum to AlN or AlON; wherein the listed compounds are
described in terms of chemical constituents rather than stoichiometry; the
transformed layer being a dielectric material over the first electrical
node; and

forming a second electrical node that is electrically separated from
the first electrical node by at least the dielectric material; the first
electrical node, second electrical node and dielectric material together
defining at least a portion of a capacitor structure.

2. The method of claim 1 wherein the at least some of the
layer is converted to AlN.

3. The method of claim 1 wherein the at least some of the
layer is converted to AlON.

1 4. A method of forming a capacitor structure, comprising:
2 forming a first electrical node;
3 forming a layer of metallic aluminum over the first electrical node;
4 transforming an entirety of the metallic aluminum within the layer
5 of metallic aluminum to AlN, AlON, or AlO; wherein the listed
6 compounds are described in terms of chemical constituents rather than
7 stoichiometry; the transformed layer being a dielectric material over the
8 first electrical node; and

9 forming a second electrical node that is electrically separated from
10 the first electrical node by at least the dielectric material; the first
11 electrical node, second electrical node and dielectric material together
12 defining at least a portion of a capacitor structure.

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14 5. The method of claim 4 wherein the transforming occurs at
15 a temperature which does not exceed 200°C.

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17 6. The method of claim 4 wherein the transforming comprises
18 transforming an entirety of the metallic aluminum within the layer to
19 AlN.

1 7. The method of claim 4 wherein the transforming comprises
2 transforming an entirety of the metallic aluminum within the layer to
3 AlN to form a resulting AlN layer; the resulting AlN layer having a
4 thickness of from about 20Å to about 40Å.

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6 8. The method of claim 4 wherein the transforming comprises
7 transforming an entirety of the metallic aluminum within the layer to
8 AlN to form a resulting AlN layer; and further comprising:

9 forming a second layer of metallic aluminum on the resulting AlN
10 layer; and

11 transforming an entirety of the second layer of metallic aluminum
12 to AlON to form a resulting AlON layer.

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14 9. The method of claim 8 wherein the resulting layer of AlN
15 has a thickness of from about 10Å to about 20Å, and wherein the
16 resulting layer of AlON has a thickness of from about 10Å to about
17 20Å.

1 10. The method of claim 4 wherein:
2 the first electrical node comprises conductively doped silicon;
3 the layer of metallic aluminum is formed on the first electrical
4 node; and

5 the transforming comprises transforming an entirety of the metallic
6 aluminum within the layer to AlN to form a resulting AlN layer; the
7 resulting AlN layer having a thickness of from about 20Å to about 40Å.
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9 11. The method of claim 4 further comprising forming a layer
10 of silicon dioxide between the first electrical node and the layer of
11 metallic aluminum; and wherein:

12 the first electrical node comprises conductively doped silicon;
13 the layer of silicon dioxide is formed on the first electrical node;
14 the layer of metallic aluminum is formed on the layer of silicon
15 dioxide; and

16 the transforming comprises transforming an entirety of the metallic
17 aluminum within the layer to AlN to form a resulting AlN layer.
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19 12. The method of claim 11 wherein the resulting AlN layer has
20 a thickness of from about 20Å to about 40Å.
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1 13. The method of claim 11 wherein the layer of silicon dioxide
2 has a thickness of greater than 0Å and less than or equal to about 15Å.
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4 14. The method of claim 11 further comprising:
5 forming a second layer of metallic aluminum on the resulting AlN
6 layer; and
7 transforming an entirety of the second layer of metallic aluminum
8 to AlO to form a resulting AlO layer.
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10 15. The method of claim 14 wherein the resulting layer of AlN
11 has a thickness of from about 5Å to about 15Å; wherein the resulting
12 AlO layer has a thickness of from about 5Å to about 15Å; and wherein
13 the layer of silicon dioxide has a thickness of from about 5Å to about
14 15Å.
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16 16. The method of claim 4 wherein the transforming comprises
17 transforming an entirety of the metallic aluminum within the layer to
18 AlON.
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1 17. The method of claim 4 wherein the transforming comprises
2 transforming an entirety of the metallic aluminum within the layer to
3 AlON to form a resulting AlON layer; the resulting AlON layer having
4 a thickness of from about 20Å to about 40Å.

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6 18. The method of claim 4 wherein:
7 the first electrical node comprises conductively doped silicon;
8 the layer of metallic aluminum is formed on the first electrical
9 node; and

10 the transforming comprises transforming an entirety of the metallic
11 aluminum within the layer to AlON to form a resulting AlON layer; the
12 resulting AlON layer having a thickness of from about 20Å to about
13 40Å.
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1 19. The method of claim 4 further comprising forming a layer
2 of silicon dioxide between the first electrical node and the layer of
3 metallic aluminum; and wherein:

4 the first electrical node comprises conductively doped silicon;
5 the layer of silicon dioxide is on the first electrical node;
6 the layer of metallic aluminum is on the layer of silicon dioxide;
7 and
8 the transforming comprises transforming an entirety of the metallic
9 aluminum within the layer to AlON to form a resulting AlON layer.

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11 20. The method of claim 19 wherein the layer of silicon dioxide
12 is formed before forming the layer of metallic aluminum.

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14 21. The method of claim 19 wherein the resulting AlON layer
15 has a thickness of from about 10Å to about 20Å.

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17 22. The method of claim 19 wherein the layer of silicon dioxide
18 is formed after forming the layer of metallic aluminum and during the
19 transforming of the layer of metallic aluminum.

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21 23. The method of claim 19 wherein the layer of silicon dioxide
22 has a thickness of greater than 0Å and less than or equal to about 15Å.
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1 24. The method of claim 4 wherein the transforming comprises
2 transforming an entirety of the metallic aluminum within the layer to
3 AlO.

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5 25. The method of claim 4 wherein the transforming comprises
6 transforming an entirety of the metallic aluminum within the layer to
7 AlO to form a resulting AlO layer; the resulting AlO layer having a
8 thickness of from about 10Å to about 20Å.

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10 26. The method of claim 4 further comprising providing a
11 transistor adjacent the capacitor structure; the transistor and a capacitor
12 structure together defining a DRAM cell comprising the transistor and
13 the capacitor structure.

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15 27. A capacitor structure, comprising:
16 a first electrical node;
17 a second electrical node; and
18 a capacitor dielectric region operatively positioned between the first
19 and second electrical nodes, the dielectric region comprising a dielectric
20 material which consists essentially of aluminum, oxygen and nitrogen;
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1 28. The capacitor structure of claim 27 wherein the dielectric
2 material comprises a thickness of from about 20Å to about 40Å.

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4 29. The capacitor structure of claim 27 wherein the dielectric
5 material is on the first electrical node.

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7 30. The capacitor structure of claim 27 wherein the dielectric
8 material is on the first electrical node, and wherein the first electrical
9 node comprises silicon.

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11 31. The capacitor structure of claim 27 wherein the dielectric
12 material is on the first electrical node, and wherein the second electrical
13 node is on the dielectric material.

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15 32. The capacitor structure of claim 27 wherein the dielectric
16 material is on the first electrical node, wherein the second electrical
17 node is on the dielectric material, and wherein the first and second
18 electrical nodes comprise silicon.

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20 33. The capacitor structure of claim 27 wherein the dielectric
21 material is separated from the first electrical node by a layer of silicon
22 dioxide.
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1 34. The capacitor structure of claim 33 wherein the dielectric
2 material comprises a thickness of from about 10Å to about 20Å; and
3 wherein the silicon dioxide comprises a thickness of from about 5Å to
4 about 15Å.
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